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(54) Interface adapter for PCMCIA and VMC bus cards.

(57) Data processing apparatus has at least first and second bus architectures and adaptor connection means comprising guide means for receiving first and second removable adaptors. First electrical contact means is located in the guide means for connecting the first adaptor to the first bus architecture. Second electrical contact means is located in the guide means for connecting the second adaptor to the second bus architecture.

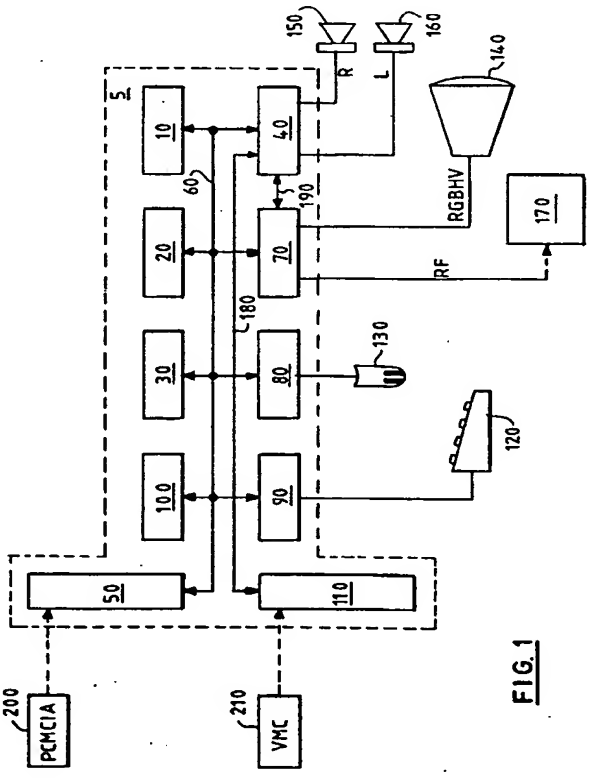

FIG.1

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The present invention relates to data processing apparatus for multimedia applications.

Many examples of data processing systems, such as personal computer systems for example, each comprise a system unit including a random access memory (RAM) a read only store (ROS), a central processing unit (CPU), display adaptor for connecting a display device to the system unit, a pointing device adaptor for connecting a pointing device such as a mouse, tablet, touch screen or the like to the system unit, a keyboard adaptor for connecting a keyboard to the system unit, and a mass storage device such as a hard disk drive or tape streamer for example, all interconnected by a system bus. In addition, the system unit typically comprises one or more similar input/output (I/O) ports linked to the system bus for connecting additional adaptors to the system bus to enhance the performance of the computer system. For example, a communication adaptor may be plugged into one of the I/O ports to permit connection of the computer system to other computer systems in a network such, for example, a token ring network.

In some conventional computer systems, the I/O ports are provided inside the system unit in the form of edge connectors linked to the system bus. However, this arrangement is inconvenient because the covers of the computer system have to be removed in order to plug in a new adaptor.

More recently, there have become available optional adaptors designed in accordance with the PCMCIA standard. Examples of well-known PCMCIA adaptors include additional mass storage cards and communication adaptor cards. Typically, a PCMCIA adaptor is encapsulated in sealed rectangular container. In plan, each PCMCIA adaptor occupies approximately the same space as a credit card. However, there are 3 Types of PCMCIA adaptor each characterised by a different thickness: Type 1 adaptors are typically 3 mm thick; Type 2 adaptors are approximately 5 mm thick; and type 3 are approximately 12 mm thick. A connector specified by the PCMCIA standard is provided along one end of the container. The connector is a universal 68 pin connector common to all PCMCIA adaptors. In use, the end of the container carrying the connector is plugged into a slot-like socket specified by the PCMCIA standard in the housing of the computer system. The connector on the adaptor mates with a reciprocal connector at the end of the socket. The reciprocal connector in the socket is linked to the system bus via a PCMCIA expansion bus in the computer system . There are three types of socket each corresponding in size to a different one of the three types of adaptor. A typical Type 3 socket includes a shell defining an approximately 12 mm thick slot for receiving a Type 3 PCMCIA adaptor such a mass storage device for example. Two type 2 reciprocal connectors are stacked one above the other at the end of the slot. The socket there not only accommodate 1 Type 3 adaptor, but also similar or mixed pair of Type 1 and Type 2 adaptors.

In view of an increasing interest in motion video image processing, the Video Electronics Standard Association (VESA) has created a high speed expansion bus standard known as the VESA Media Channel (VMC) for transferring motion video data from motion video adaptors into computer systems. The VMC bus can carry video data from up to fifteen external devices. Video data is placed on the VMC bus in data packets each having a header indicating the source and format of the video data.

The aforementioned additional interfacing capability provided by the PCMCIA expansion bus standard has adequate bandwidth to permit transfer of some types of data into the computer system from external devices. However, the bandwidth of the PCMCIA expansion bus is insufficient to adequately complete the VESA Media Channel between a motion video adaptor and a host computer system. It is therefore not possible to provide the additional function offered by VMC adaptors in a computer system having a PCMCIA expansion bus alone.

In accordance with the present invention, there is now provided adaptor connection apparatus for a data processing system having at least first and second bus architectures, the apparatus comprising: guide means for receiving first and second removable adaptors; first electrical contact means located in the guide means for connecting the first adaptor to the first bus architecture; second electrical contact means located in the guide means for connecting the second adaptor to the second bus architecture.

The adaptor connection apparatus of the present invention preferably comprises keying means for preventing connection of the first adaptor to the second bus architecture. The keying means is preferably located in the guide means. In a preferred embodiment of the present invention, the keying means comprises sensor means for sensing an identification code on the second adaptor as the second adaptor is received in the guide means and for disabling the second contact if the sensed identification code is not recognised.

The first adaptor may be a PCMCIA adaptor and the second adaptor may be a VESA Media Channel adaptor. In a particularly preferred embodiment of the present invention, the VESA Media Channel adaptor comprises: a container; a VESA Media Channel adaptor circuit mounted within the container; and an electrical contact located at one end of the container for contacting the second adaptor means. For convenience, the container can be approximately the same size as a container for a PCMCIA adaptor.

Viewing the present invention from another aspect, there is now provided data processing apparatus including: a first bus architecture; a second bus architecture; a central processing unit connected to

the first bus architecture; a video processor connected to the second bus architecture; and adaptor connection apparatus comprising guide means for receiving first and second removable adaptors, first electrical contact means located in the guide means for connecting the first adaptor to the first bus architecture, second electrical contact means located in the guide means for connecting the second adaptor to the second bus architecture. The first bus architecture may be a system bus architecture and the second bus architecture may be a VESA Media Channel.

Viewing the present invention from yet another aspect, there is now provided display apparatus comprising: a housing; a display device mounted in the housing; means for releasably mounting a removable pod containing data processing apparatus in the housing, the data processing apparatus including a first bus architecture, a second bus architecture, a central processing unit connected to the first bus architecture, a video processor connected to the second bus architecture, and adaptor connection apparatus comprising guide means for receiving first and second removable adaptors, first electrical contact means located in the guide means for connecting the first adaptor to the first bus architecture, second electrical contact means located in the guide means for connecting the second adaptor to the second bus architecture; and means for connecting the video processor of the data processing system to the display device when the removable pod is mounted in the housing.

Preferred embodiments of the present invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a block diagram of a computer system of the present invention;

Figure 2 is a block diagram of a video subsystem of the computer system;

Figure 3 is a simplified perspective view of the computer system;

Figures 4A and 4B are end views of an adaptor socket for the computer system with adaptor absent and inserted respectively; and

Figures 5A and 5B are, respectively, a plan view of the adaptor socket and a cross section along line A-A' through the socket when viewed in the direction of the arrows.

Referring first to Figure 1, a computer system comprises a system unit 5 including a random access memory (RAM) 10, a read only store (ROS) 20, a central processing unit (CPU) 30 such as an Intel 80486 microprocessor for example, an audio adaptor 40, a display adaptor 70, a pointing device adaptor 80, a keyboard adaptor 90, a PCMCIA interface 50, and a mass storage device 100 such as a hard disk drive or tape streamer for example, all interconnected by a system bus 60. A VESA Media Channel (VMC) interface 110 is connected to display adaptor 40 independently of system bus 60 by a VMC bus 180. An audio channel 190 between display adaptor 70 and audio adaptor 40 permits transmission of audio from display adaptor 70 to audio adaptor 40. System unit 5 is connectable via adaptor 90 to a keyboard 120. A pointing device 130 such as a touch screen, a tablet, or a mouse can be connected to system unit 5 via pointing device adaptor 80. System unit 5 is also connectable via display adaptor 70 to a visual display unit 140 such as a cathode ray tube (CRT) display or a liquid crystal display for example. System unit 5 is further connectable via display adaptor 70 to a television receiver 170, video tape recorder or the like. At least one PCMCIA adaptor 200 can be connected to system unit 5 via interface 50. PCMCIA adaptor 200 may be an additional hard disk drive or a communication adaptor such as for example a token ring adaptor for linking system unit 5 to other computer systems to form a computer network. Alternatively, PCMCIA adaptor 200 may be a modem for linking system unit 5 to a telephone network. Similarly, at least one VMC adaptor 210 can be connected to system unit 5 via VMC interface 110. VMC adaptor 210 may for example be a television tuner module, a MPEG video receiver, an S-video receiver, or a video games module. VMC adaptor 210 is preferably similar in physical form to a conventional PCMCIA adaptor 200. Specifically, VMC adaptor 210 is encapsulated in sealed rectangular container. In plan, VMC adaptor 210 occupies approximately the same space as a credit card. However, there are 3 Types of VMC adaptor 210 each characterised by a different thickness: Type 1 VMC adaptors are typically 3 mm thick; Type 2 VMC adaptors are approximately 5 mm thick; and type 3 are approximately 12 mm thick. A connector specified by the VMC standard is provided along one end of the container. The connector is a universal 68 pin connector common to all VMC adaptors.

In operation, CPU 30 processes data stored in a combination of RAM 10 and mass storage device 100 under the control of computer program code stored in a combination of ROS 20, RAM 10, and mass storage device 100. Keyboard and mouse adaptors 90 and 80 permit data and instructions to be manually entered into system unit 5 from keyboard 120 and mouse 130 respectively. Audio adaptor 40 translates output data from system unit 5 into stereo audio signals L and R for driving a pair of loudspeakers 150 and 160. Audio adaptor 40 also generates signals for driving speakers 150 and 160 in response to audio signals transmitted from display adaptor 70 via audio channel 190. Display adaptor 70 translates output data from system unit 5 into video signals, R, G and B, and horizontal and vertical picture synchronisation (sync) signals, H and V, for configuring display 130 to generate a visual data output. In addition, display adaptor 70 can translate output data from system unit 5 generate a television signal RF for driving for reception by, for

example, a television receiver 170 or a video tape recorder. Furthermore, display adaptor can generate video signals R, G, and B and sync signals, H and V, or television signal RF, in response to motion picture video data transmitted from VMC adaptor 210 via VMC interface 110 and VMC bus 180. Display adaptor 70 thus permits visual output from system unit 5 via either a domestic television receiver or a computer visual display unit. System bus 60 includes core logic (not shown) which may be hard-wired logic or a combination of hard-wired logic and computer program code for coordinating data transfer between RAM 10, ROS 20, CPU 30, storage device 100, PCMCIA interface 50, VMC interface 110, adaptors 40, 90, 80 and 70, 200, and 210, and also serial and parallel printer ports (not shown).

Referring now to Figure 2, the video subsystem of system unit 5 includes display adaptor 70. Display adaptor 70 includes a video decoder 230 connected to VMC bus 180; a video controller 240, such as an S3 928 video controller IC produced by S3, is connected to output of video decoder 230 and to system bus 60; and a video random access memory (VRAM) connected to video controller 240 and video decoder 230. A digital to analog convertor is connected to video controller 240. VMC interface 110 consists of a pair of connectors 290 each for engaging a separate VMC adaptor 210. PCMCIA interface 50 comprises a pair of PCMCIA connectors 280 each for engaging a separate PCMCIA adaptor 200. Connectors 280 are each connected via a PCMCIA bus 270 and a PCMCIA bus controller 260 to system bus 60.

In operation, VMC bus 180 carries decompressed digitised Y, U and V video data and possibly additional decompressed digitised audio data from a VMC adaptor 210 plugged into either of connectors 290 to video decoder 239. The audio data is extracted and sent to audio adaptor 40 via audio channel 190. Video decoder 230 decodes to Y, U, and V video data received from adaptor 210 to produce at 300 R, G, and B video data for storage in VRAM 220. Video controller 240 reads R, G and B video data from VRAM and writes it to DAC 250. In turn, DAC 250 converts the R, G and B video data into analog R, G and B video signals for driving display device 140. Video controller 240 also writes to and reads from VRAM 220, data provided on system bus 60. Furthermore, video controller can also scale video data stored in VRAM 220 for display in a window within the image displayed on display device 140.

Referring now to Figure 3, a particularly preferred embodiment of the present invention comprises a housing 320. Display device 140 is mounted in the housing. Loudspeakers 150 and 160 are mounted on the sides of housing 320. An opening 350 for receiving a pod containing system unit 5 is located in the housing beneath the screen of display device 140. Opening 350 includes guides (not shown) upon which the pod slides into latching engagement with the housing. Complementary connectors (not shown) are provided on the inside of opening 350 and on the outside of pod 310 for connecting the R, G B, H and V outputs of display adaptor 70 to display device 140 and for connecting the stereo audio outputs L and R of audio adaptor 40 to loudspeakers 150 and 160. Complementary connectors are also provided on the inside of opening 350 and on the outside of pod 310 to establish a serial communication channel from system unit 5 to display device 140 through which control data can be passed between system unit 5 and display device 5. The control data includes electronic display identification data supplied by display device 140 to system unit 5 to enable system unit 5 to determine the performance parameters of display device 140 and image parameter data supplied by system unit 5 to display device 140 to adjust the operating parameters of display device 140 such as, for example the geometry, brightness, or contrast of the displayed image. VMC and PCMCIA connectors 290 and 280 are located on the front face of pod 310 for easy insertion and replacement of VMC and/or PCMCIA adaptors when the pod is located in housing 320. In this particulary preferred embodiment of the present invention, system unit 5 further comprise an optical disk drive 330 such as a Compact Disc reader or the like and a floppy disk drive 340. Because system unit 5 is located in removable pod 310, the overall computer system can easily be upgraded simply by replacing pod 310 with a new pod containing for example an upgraded CPU or a completely new different architecture. Furthermore, pod 310 can be used as a so-called set top box for driving a domestic television receiver 170 via television signal RF and/or audio signals L and R from display adaptor 70 remote from housing 320, loudspeakers 160 and 150 and display device 140 mounted therein. System unit 5 includes a receiver (not shown) for receiving instruction from a remote control handset. This allows the user to operate pod 310 in a similar manner to, for example, a conventional television receiver, to select a desired application such as, for example, a video game or a movie via appropriate VMC adaptors plugged into the front of the pod.

Referring now to Figure 4, in an especially preferred embodiment of the present invention, PCMCIA connectors 280 and VMC connectors 290 are paired together. Each pair of connectors 280 and 290 is carried in a Type 3 socket 360. Use of a type 3 socket advantageously minimises the space occupied by VMC and PCMCIA ports on the exterior of pod 310 while optimising the number of VMC and PCMCIA adaptors receivable. Socket 360 comprises a shell 370 open at one end to define a mouth 440 capable of receiving at most a Type 3 adaptor. Connectors 280 and 290 are located in stacked formation at the closed end of shell 370. VMC connector 290 is connected to VMC bus 180. PCMCIA connector 280 is connected to PCMCIA

bus 270. Pairs of guides 390 and 380 in the form of grooves extend along the inside of shell 370 along opposite faces of mouth 440 from the open end of shell 270 to the closed end. Guides 380 and 390 are positioned to align the connectors of VMC and PCMCIA adaptors 200 and 210 with their respective connectors 280 and 290.

Referring now to Figure 4B, VMC adaptor 210 is encapsulated in a container 410 having a base forming a peripheral flange 400. Similarly PCMCIA adaptor 280 is encapsulated in a container 420 having a base forming a peripheral flange 430. In operation, flange 430 engages guides 380 to align the connector of PCMCIA adaptor 200 with PCMCIA connector 280. Similarly, flange 400 engages guides 390 to align the connector of VMC adaptor 210 with VMC connector 290. From the above it will be appreciated that socket 360 can receive any of the following:

1. A Type 1, 2 or 3 PCMCIA adaptor 200;
2. A Type 2 VMC adaptor 210;
3. A Type 2 VMC adaptor 210 plus a Type 1 or Type 2 PCMCIA adaptor 200.
4. A Type 3 VMC adaptor 210 which is VMC compatible only; and
5. A Type 3 VMC adaptor 210 which is compatible with both VMC and PCMCIA.

Socket 360 further comprises keying means for preventing PCMCIA adaptor 200 from being plugged into VMC connector 290. The keying means is provided by the differing sizes of guide pairs 380 and 390 and the correspondingly differing sizes of flanges 430 and 400 on adaptors 200 and 210 respectively. Specifically, flange 430 is too large to fit into guide pair 390. Therefore, adaptor 200 cannot be inserted towards connector 290. However, flange 400 is smaller enough to fit into both guide pairs 380 and 290. Therefore, subject to Type number, VMC adaptor can be plugged into either VMC connector 290 or PCMCIA connector 280. It will be appreciated that the present invention extends to other keying formats to, for example, prevent VMC adaptor 210 from engaging PCMCIA connector 280 in addition to preventing PCMCIA adaptor 280 from engaging VMC connector 290.

Referring now to Figure 5A, a modification to the especially preferred embodiment of the present invention hereinbefore described includes a sensor 450 located in socket 360 for sensing an identification (ID) code from VMC adaptor 210 as it is inserted into guide pair 390 towards VMC connector 290. The ID code identifies the type of VMC adaptor 200. For example, the ID code on an MPEG VMC adaptor differs from the ID code on a games VMC adaptor. The sensed ID is sent by sensor 450 to CPU 30. By examining the ID code received from sensor 450, CPU determines the type of VMC adaptor being connected to system unit 5. If CPU 30 does not recognise the type of VMC adaptor being inserted or if no ID code is detected, for example, in the situation where a PCMCIA adaptor is being inserted towards VMC connector 210, CPU 30 can thus disable VMC bus 180 and issue an error message before, for example, the integrity of data currently in system unit 5 is jeopardised. It will be appreciated therefore, that sensor 450 provides an alternative keying means to the mechanical arrangement hereinbefore described with reference to Figure 4A and 4B. Viewing Figure 5B, in one embodiment of the present invention, sensor 450 may include a light source 460 and a photo-detector 470 facing each other across a groove of guide pair 390. The ID code is encoded onto VMC adaptor 290 in the form of a sequence of perforations in that part of flange 400 receivable in the groove through which light passes between source 460 and detector 470. As the flange travels along the groove when adaptor 210 is inserted, the ID code is sequentially read by sensor 450. The perforations alternately open and close the light path between source 460 and detector 470. It will be appreciated that in other embodiments of the present invention, sensor 450 may be implemented using different techniques. For example, sensor 450 may alternatively be implemented by a magnetic head for reading data encoded onto a magnetic strip located on either flange 400 or container 410 of adaptor 290. Alternatively, sensor 450 may in the form of an optical bar code reader.

Claims

1. Adaptor connection apparatus for a data processing system having at least first and second bus architectures, the apparatus comprising: guide means for receiving first and second removable adaptors; first electrical contact means located in the guide means for connecting the first adaptor to the first bus architecture; second electrical contact means located in the guide means for connecting the second adaptor to the second bus architecture.

2. Apparatus as claimed in claim 1, comprising keying means for preventing connection of the first adaptor to the second bus architecture.

3. Apparatus as claimed in claim 2, wherein the keying means is located in the guide means.

4. Apparatus as claimed in claimed 2 or claim 3, wherein the keying means comprises sensor means for sensing an identification code on the second adaptor as the second adaptor is received in the guide means and for disabling the second contact if the sensed identification code is not recognised.

5. Apparatus as claimed in any preceding claim wherein the first adaptor is a PCMCIA adaptor.

6. Apparatus as claimed in any preceding claim wherein the second adaptor is a VESA Media Channel adaptor.

7. Apparatus as claimed in claim 6 wherein the VESA Media Channel adaptor comprises: a container; a VESA Media Channel adaptor circuit mounted within the container; and an electrical contact located at one end of the container for contacting the second adaptor means.

8. Apparatus as claimed in claim 7 wherein the container is approximately the same size as a container for a PCMCIA adaptor.

9. Data processing apparatus comprising: a first bus architecture; a second bus architecture; a central processing unit connected to the first bus architecture; a video processor connected to the second bus architecture; and adaptor connection apparatus as claimed in any preceding claim.

10. Apparatus as claimed in claim 9 wherein the first bus architecture is a system bus architecture and the second bus architecture is a VESA Media Channel.

11. Display apparatus comprising: a housing; a display device mounted in the housing; means for releasably mounting a removable pod containing a data processing apparatus as claimed in claim 5 or claim 6 in the housing; and means for connecting the video processor of the data processing system to the display device when the removable pod is mounted in the housing.

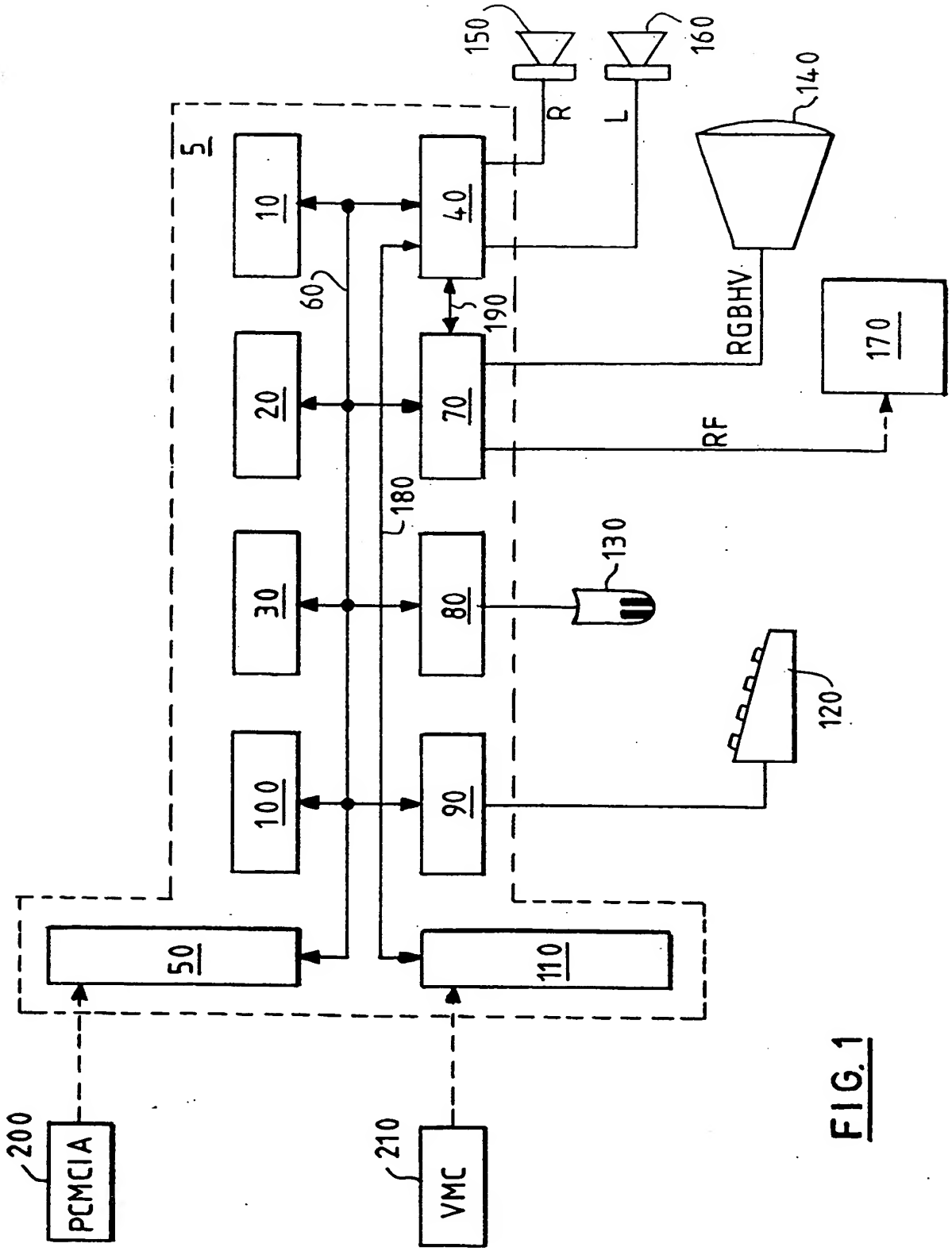

FIG. 1

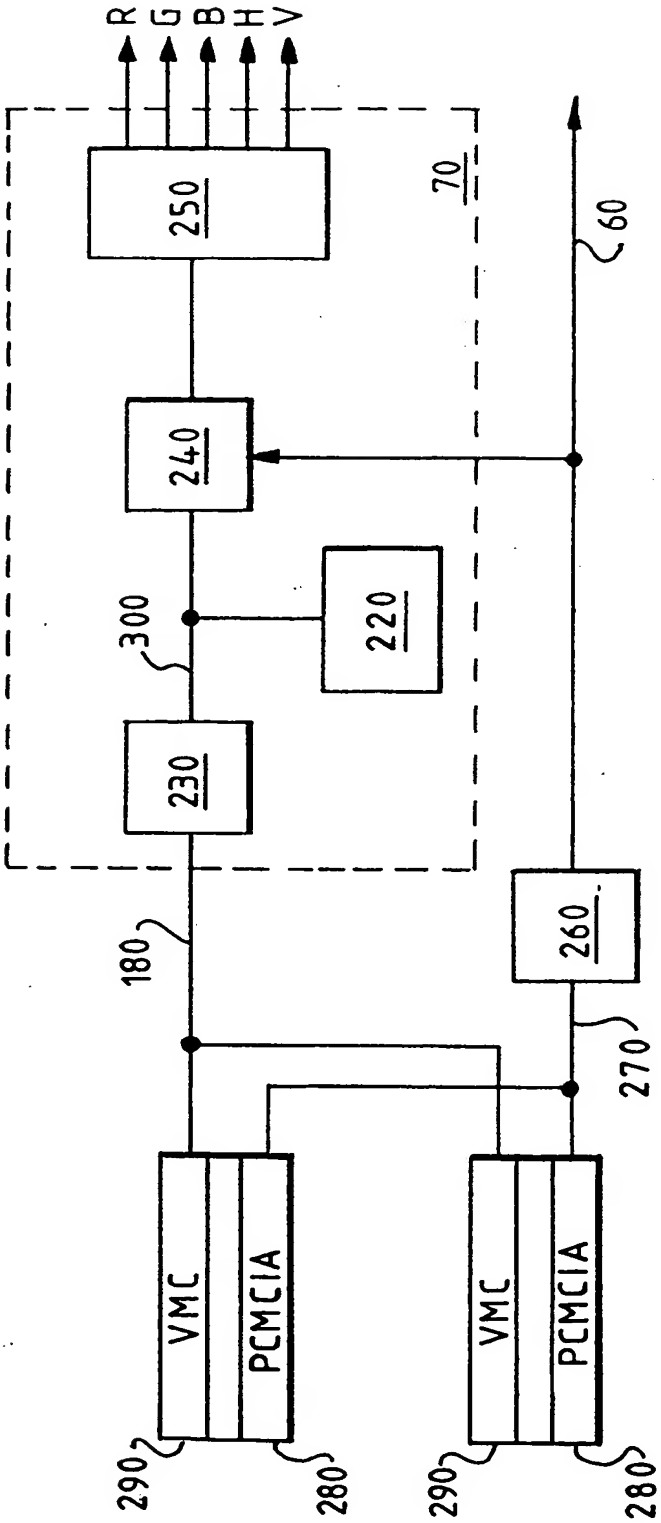

FIG. 2

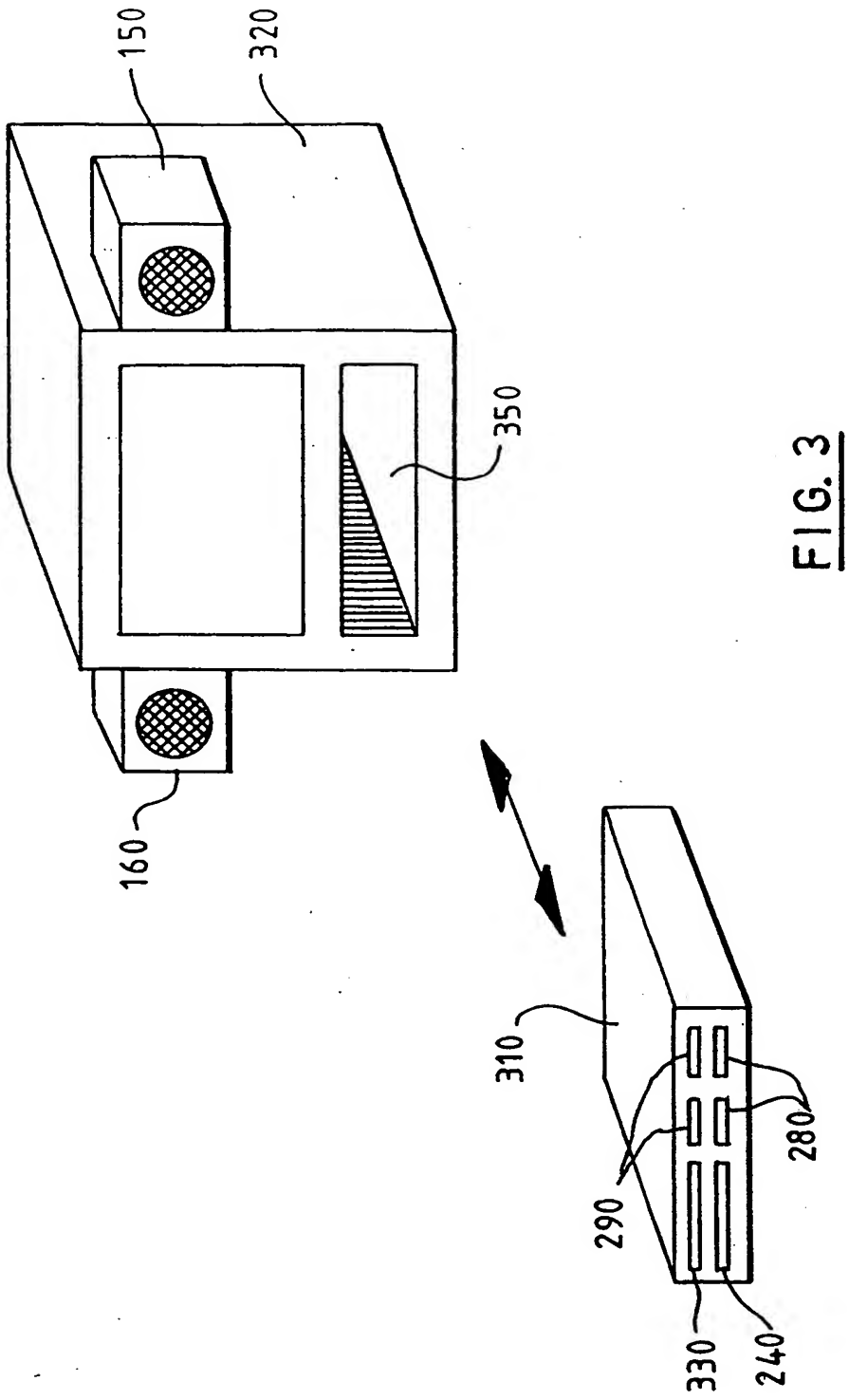

FIG. 3

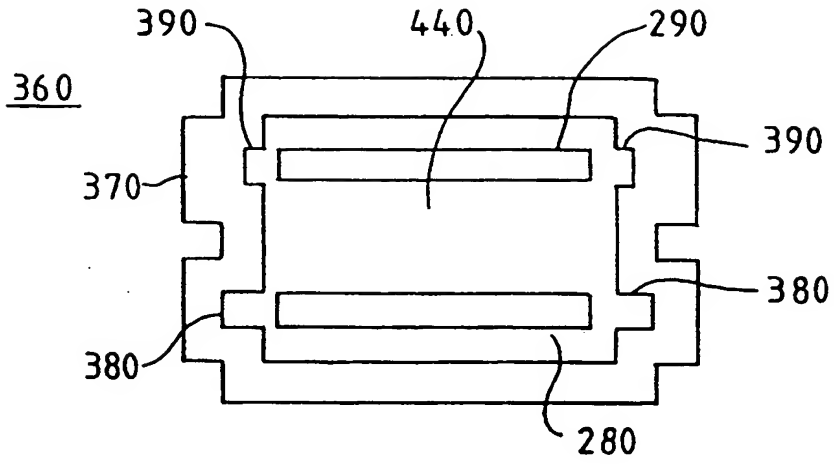

FIG. 4A

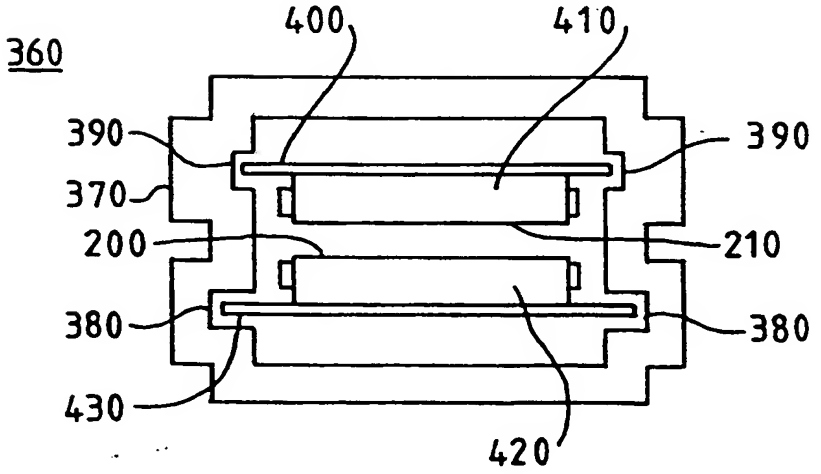

FIG. 4B

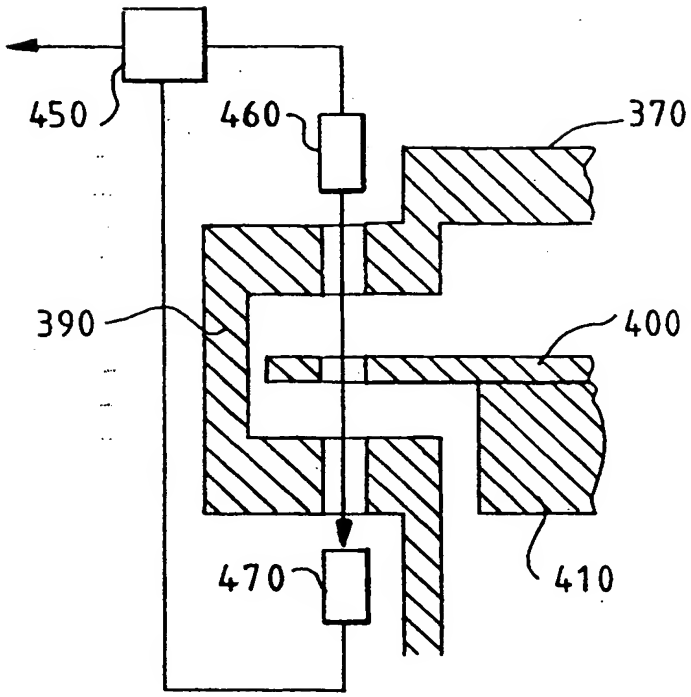

FIG. 5B

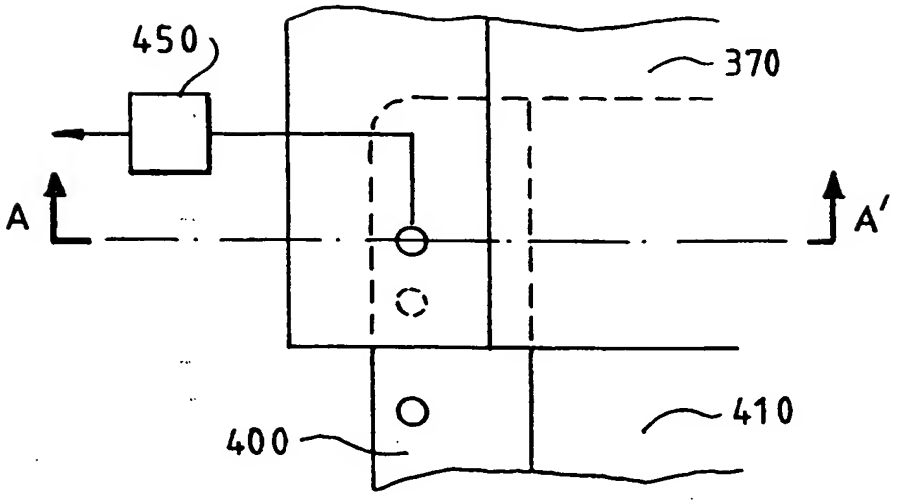

FIG. 5A

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 30 0326

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP-A-0 117 954 (GULF & WESTERN) * claims 1,2; figure 1 *	1	G06F13/40 G06F1/16
A	IBM TECHNICAL DISCLOSURE BULLETIN, vol. 33,no. 10b, March 1991 NEW YORK US, pages 235-241, 'Implementation of Logic Book/Cage Keys' * page 235, paragraph 1-3; figures 1,2 *	2,3	
A	ELEKTRONIK, vol. 43,no. 25, January 1994 MUNCHEN DE, pages 79-86, H. STRASS 'PCMCIA: Karten gut gemischt' * the whole document *	5,8	
A	WO-A-94 00970 (OAKLEIGH SYSTEMS) * claims 1-10; figures 1,3-5 *	11	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) G06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 May 1995	Gill, S

CATEGORY OF CITED DOCUMENTS

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